

SCIENCE.

FRIDAY, OCTOBER 8, 1886.

COMMENT AND CRITICISM.

TWENTY-NINE MEN, at an expense of ninety dollars per diem, are employed in Chicago by the U.S. government in quarantining cow-stables which are infected with contagious pleuro-pneumonia. Our federal authorities are wonderfully paternal when they desire to be, and the U. S. laws are at times remarkably flexible. Singularly enough, however, the activity is usually displayed in a direction which is suggestive of a desire to propitiate the farming interests. Thus a tax is put upon oleomargarine, and local cow-stables, from which disease might spread to other localities, are quarantined at the national expense; but when the question of restricting the importation of possibly infected rags is broached, we are told that the matter is one with which the general government cannot interfere, and that it must be left to the local authorities. We are far from deprecating governmental interference in this matter of pleuro-pneumonia, but we would like to see the same careful supervision exercised in all matters which affect the public health, as much when they concern the urban as when they affect the rural population.

THE PROBLEM of how to deal with the financial difficulties in the way of obtaining any very great number of graduate students at our colleges and universities, in spite of the great educational advantages offered, is one that has given and is giving considerable trouble. When a young man takes his bachelor's degree at twenty or twenty-one, he is quick to see the advantages of a post-graduate course of special study as a broader and deeper preparation for his professional career, but he hesitates to incur the necessary expense. Not only must he be a non-producer during the extended period of study, but his expenses, including usually a considerable tuition fee, are heavy. When this aspect of the question is considered and weighed against the inducements to follow some career that will provide self-support immediately, we cannot wonder that the financial consideration is the determining one in the minds of many young men. President Barnard of Columbia sees this obstacle

to the increase of students in our university courses, and in his report for the past academic year, which has just been published, earnestly recommends that the tuition-fee now required of graduate students be abolished. This is a step in the right direction, and we trust that it will be taken by Columbia's trustees, and followed by other institutions. A more efficient and advantageous remedy is the foundation of numerous graduate scholarships and fellowships, but to enter upon this on any considerable scale requires more spare funds than more than one or two of our educational institutions can boast of. It is here that private munificence should step in to aid educational and scientific advance.

THE PUBLISHED REPORTS from the English eclipse expedition to the island of Grenada show, in general, a very gratifying amount of success; and, although thus far the photographs of the corona have failed to establish Dr. Huggin's method upon the firm footing we had hoped for, a fuller account of the circumstances may throw some light upon the matter. We shall also await with peculiar interest the results of Mr. Pickering's work. Photometric observations, and photographs of the corona and of its spectrum, were obtained by the different branches of the English party, and also good spectra of the prominences, showing the bright lines of highly incandescent vapors. "In this respect the result resembles that obtained in the two previous eclipses, though it was thought possible that this year, being one when sun-spots are tending to a minimum, would be marked by the more continuous spectrum that bespeaks lower temperature." The bright lines of the prominences were displaced in such a direction as to prove that there was a downrush of gas towards the sun. The observations of the corona also confirm those of the last two eclipses.

THE LACK OF INTEREST which is manifested by public bodies in matters which pertain to the improvement of the public health has never been better illustrated than by the common council of Brooklyn in their treatment of certain proposed amendments to the ordinances of that city relating to tenement-houses. While New York has,

by virtue of recently enacted laws, made great strides in the matter of tenement-house reform, Brooklyn stands where she did in 1867, when the Metropolitan board of health existed. In May, 1885, more than sixteen months ago, the health commissioner forwarded to the common council a number of amendments to the old law, which the experience of nearly twenty years had proved to be necessary for the welfare of the poor. These amendments required the construction of all new tenement-houses to be in accordance with the requirements of the health department as to light, ventilation, plumbing, and drainage, and prohibited the building of such a house so as to occupy more than sixty-five per cent of the lot on which it stands. Other suggested changes were of equal importance and value. Before the amended ordinances can have validity, they must be approved by the common council. Thus far, no sign has been given that this body has the least intention of acting upon them in any way, and it is more than probable that they have been consigned to a pigeon-hole, from which they will never be removed.

THE ATTENTION OF PHYSICIANS and other philanthropists has of late been more directed to the care of the inmates of public institutions than ever before, and as a result many cases of neglect and ill treatment have come to light which would otherwise have been soon forgotten by every one cognizant of the facts; excepting, perhaps, the poor victims, who, being without friends or influence, could not bring their wrongs to the notice of the authorities. In view of the possibilities, to say the least, of what might happen in institutions, the friends of reform succeeded in passing through the last legislature of New York a bill which is entitled "An act for the better preservation of the health of children in institutions." It went into effect Oct. 1 of this year. The provisions of this law apply to all institutions which have been founded for the harboring of children. The act, which is known as chapter 633, requires every institution of this kind to have attached to the service a regular physician of good standing. His duties consist in examining every child that applies for admission, and issuing a certificate of its freedom from contagious disease or not, as the case may be. The certificate must also state the mental and physical condition of the child. He is also held responsible for the sanitary condition of the building, and must report the same to the

officials of the institution and to the board of health. It is made the duty of this latter body to investigate at once any complaints made to it, and to remedy in a prompt manner the defects found. If any of the children become affected with any of the contagious diseases, including those of the eye and skin, they must not be permitted to remain unless they can be properly isolated and taken care of without prejudice to the other children. The law also requires that special attention be paid to the ventilation of the buildings. A refusal to comply with the provisions of the law constitutes a misdemeanor. We had occasion, in a recent issue of *Science*, to speak of the large number of children in public institutions who suffered from contagious ophthalmia, — a disease which, if neglected, is liable to destroy the eyesight of those attacked. The law to which we have just referred will do much to reduce this evil, and indeed, if completely fulfilled, to eradicate it entirely from the places where for so long a time it has found its victims by the score.

M. EUGENE STROPENO, the writer who has an article in a late issue of the *Revue internationale de l'enseignement* on higher education in the United States, has very carefully digested for his readers the report of the commissioner of education for 1883-84. M. Stropeno gives no evidence, in his article, of any personal acquaintance with our educational system, and therefore has nothing critical to advance. He merely gives an exposition of Commissioner Eaton's report, and the elaborate tables of statistics accompanying it. In touching on the Harvard system of electives, M. Stropeno quotes the criticisms of Presidents Porter and McCosh, and is inclined to side with them in the view they take of President Eliot's policy. Whatever the writer's views, it is refreshing to see so full and painstaking an exposition of what our colleges and professional schools are, and are doing for the benefit of foreign readers. And among no people is the new pedagogical movement more active than among the French. In the following number of the same review, there is an appreciative account of Fichte's pedagogical theory and influence, by Professor Hallberg of Toulouse. We can heartily recommend this short sketch to those educators who would know what Fichte taught and did. It must be borne in mind that he was the man who showed Pestalozzi the latter's essential agreement with Kant, and it was he

who predicted that from Pestalozzi's institute would come the regeneration of the German nation. Fichte's own *Reden an die deutsche nation* is an educational classic, and his influence in Germany is perceptible to this day. What Professor Hallberg has to say is far too brief to be exhaustive, but it is very instructive so far as it goes.

THE MODERN MUSEUM.

THE Prince of Wales, in a letter to the lord-mayor of London under date of Sept. 13, proposes the formation of a permanent museum, to represent the arts, the manufactures, and the commerce of the queen's colonial and Indian empire, as a fitting memorial of the queen's jubilee. In the London *Spectator* of Sept. 25 is an article upon the Prince of Wales's idea, which brings out so prominently the advantages of the modern museum, that we quote from it extensively below. The *Spectator* refers to the difficulty of treating as a whole the English colonies and the English dependencies; but, as diversity is so singular a character of the empire, it ought certainly to be reflected in any such institute. The Prince of Wales points out especially the advantage of such an institution in stimulating and efficiently directing emigration by giving to those frequenting it a more correct picture of the lands to which they might have thought of going. Again, it is almost needless to point out the commercial advantages of a permanent museum of the products of the empire, for it would serve the purpose of advertising, which is an essential of mercantile progress; but, as said, the prince is probably right in putting emigration first of all in his list of benefits.

Emigration, wisely undertaken, is an unmixed blessing to the working-classes. It gives the man who emigrates the opportunity which no man can ever be quite content till he has had, whether he fails or not, — the opportunity of making a fortune, and of emerging from the dullness of the ranks of life. It gives to the workman who stays that relief from the pressure of competition which he so much needs. With these results before them, people of the upper class constantly wonder how it is the workingmen are not more eager about emigration, and in general can only be induced to adopt it as a final resort from misery. They argue, "In our rank of life, the younger sons all emigrate," and call to mind the not unfrequent cases where, out of a family of six, four will have left England. "We do it easily enough," they say; "why, then, won't the workingmen, where the pressure is so much greater and the in-

ducements comparatively so much higher?" The answer, of course, rests in the fact that the one class of men know geography, and the other do not. The young man who determines to go to Florida knows where Florida is, and, before he chooses it, has been able to picture to himself, by the information he has the means of getting easily, the kind of life he will have to lead. The notion has no nameless, shapeless, unknowable terrors for him. He has seen plenty of Americans, and knows that they are like other men, and that, but for the banishment from England, he will be happy enough. So, too, with the woman of education who accompanies her husband when he emigrates: she has not that physical dread of an awful existence, with no relation to previous experiences of life, which is so often to be witnessed among the women of the poor. With the artisan, or at any rate with the laborer and his wife, it is just the reverse. They have not the means of obtaining knowledge by which to compare the various lands that invite emigration. They are quite unable to acquaint themselves, or to grow familiar, with the idea of the new social and material conditions that await them. Thus their ignorance of the colonies allows the wildest notions of misery and discomfort to take possession of them, — notions that practically forbid them emigrating, except in case of severe pecuniary pressure. They will seldom emigrate to better themselves; only do it, in fact, to prevent themselves falling lower. An institute where these spectres can be laid will be of immense use in increasing timely emigration, — emigration of men who are not driven by despair. If the London artisan can see good photographs of the Australian and Canadian towns and settlements, and can notice around him the rich produce of the colonies (the sugar, the wool, the wood, the corn, the wine, the oil); if he can learn that men live there as they live here, that there are public-houses and Sunday-schools, and that he will not be daily expected to encounter naked savages; and if at the same time he can get intelligent advice and direction from competent instructors on the spot, — he will soon find his fears and dismal forebodings of colonial wretchedness die away.

But if the working-men are really to make use of the institute, for this or for the other purpose of political education, it will be utterly useless to place it in the West End. Working-men will not and can not travel for miles, at a considerable expense of money and comfort, to see a museum. If it is placed in a convenient situation, they will flock to it as eagerly as they do to Mr. Barnett's Easter exhibitions of pictures. If the institute is to do the good work it ought to do, and can do, it must,

be placed, if not geographically, at least morally, at the East End of the town; that is, it must be built in a poor quarter. Even in common fairness, the poor have a right to the site of the next museum. When the natural history collections were removed from the British museum to South Kensington, a great opportunity was missed. There is no taste more common among the poor than the taste for natural history. Had the stuffed beasts and birds with which the people of the West End are so heartily, so naturally bored, been put up in Whitechapel, they would have been welcomed by streams of admirers. Such a mistake ought not to be made this time. Of course, the architects, the men of science, and the artists like to see ranges of imposing galleries, and consider the collections and the advantages of the site far more than they do the public that looks at them, or that pays for them. Even they, however, would relent if they realized how useful, how pleasure-giving, how healthful a triumph might be secured by placing the great collections of art and science within the reach of the poor. Practically, they cannot go to the collections, and so the collections should go to them wherever possible or reasonable. But the rich can go into the East End to see exhibitions, and the more they are compelled to go there, the better. Let them, by going to see the new institute, learn where the poor live in London, and let them realize the condition of life there, and discover how, though materially it is nothing like so awful as they fancy in their compassionate and sentimental moments, it is, as far as education, self-improvement, rational and healthful pleasure are concerned, far below any standard which we can be content with.

Although so much of this was written for English readers, its truths are of value in America.

THE HEALTH OF NEW YORK DURING AUGUST.

THE population of New York is estimated at 1,446,000. Of this number, 3,246 died in the month of August, a decrease of 952 deaths as compared with the preceding month. Among children under five years of age, 939 less deaths occurred than in July, while there was also a diminished mortality from diarrhoeal diseases, amounting to 677. Diphtheria proved fatal in 104 cases, as against 133 in July; and scarlet-fever caused but 15 deaths, a gain of 10 as compared with the preceding month. The week ending on the 28th is noteworthy as having no deaths recorded from scarlet-fever, which is a most remarkable incident in a city of a million and a half of people. The deaths from consumption

were 443, four more than are recorded for July. It will be seen from these figures that the health of New York is improving; and, unless the temperature and humidity of the early fall are unpropitious, we shall expect to see a gradual falling of the death-rate until winter sets in, when the deaths from diseases of the respiratory organs will so increase as to again augment it.

August was pre-eminently a cool month. The mean temperature was but 70.19° F. An examination of the record of temperature as far back as 1870 fails to show any August in which the mean was so low. The nearest approach to it was in 1874, when it was 70.25° F. In most of the years during the past decade the mean has been above 72° F., and in one year, 1877, reached 75.37° F. The maximum point attained by the mercury during the month was 90° F., at 4 P.M. of the 28th. In four of the past ten years the August temperature has been the same as this year. In 1884 and 1885 it was one degree higher, and in 1880 and 1883 one degree lower. 90° F. may be considered as the maximum temperature for August for the past ten years. The lowest recorded temperature this year was 53° F., at 3 A.M. of the 22d.

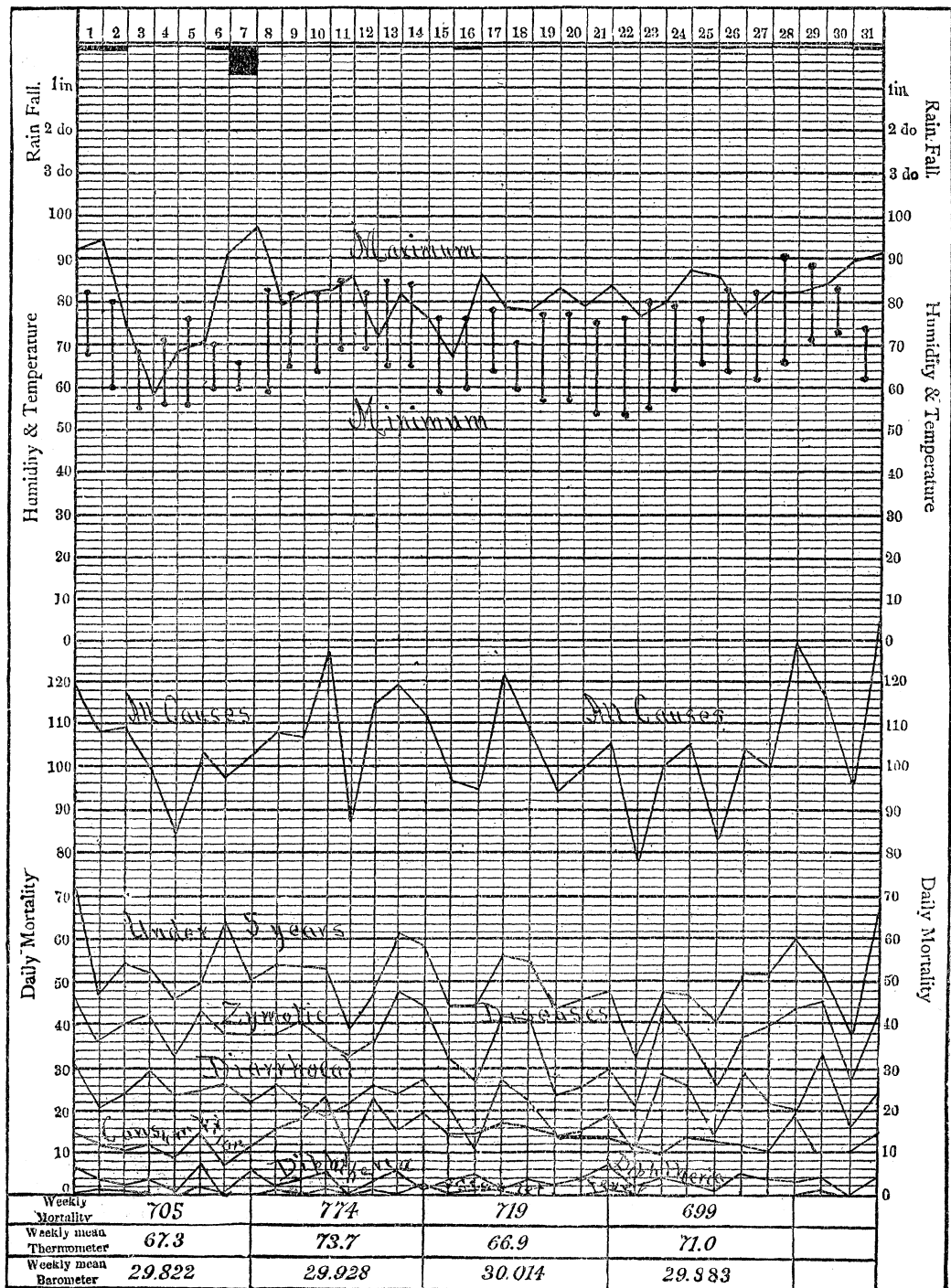
The rainfall of August, 1886, was also remarkable. Although some rain fell on six days of the month, the total amount was but .95 of an inch. From this it will be seen that the month was a very dry one. In but one year, 1881, since 1877, has the rainfall been so small. In 1885, 5.67 inches fell; and in the previous year, 1884, no less than 7.90 inches is recorded. The mean for ten years was 4.22 inches. July and August have been very noteworthy for the small quantity of rain which has fallen.

ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS.

THE Proceedings of the third annual convention of this association, which was held in Washington on the 26th and 27th of August, have just been issued as Bulletin No. 12 of the chemical division of the department of agriculture.

The benefit which has been derived from these meetings of the chemists of the country, who are engaged in the analysis and control of commercial fertilizers, has been very marked; and the adoption of a uniform official method of working has not only resulted in greater agreement among official chemists, but has also, by informing the analysts employed by those manufacturing fertilizers, of the methods in use, brought about greater harmony between the manufacturers and the control stations.

The results in this direction having been so sat-



isfactory, it was decided this year to enlarge the scope of the association, so that it now includes "the consideration of uniformity and accuracy in the analysis of fertilizers, soils, cattle-foods, dairy products, and other materials connected with agricultural industry," and "affords opportunity for the discussion of matters of interest to agricultural chemists." All persons exercising official control of the materials above named, or who are connected with departments of agriculture, agricultural experiment-stations, agricultural colleges, and state boards of agriculture, are eligible to membership. Under this extension of its field, the association will, no doubt, do as much for the improvement in accuracy and uniformity of the analysis of other materials as it has done for fertilizers.

The Proceedings contain the reports of committees on the estimation of phosphoric acid, nitrogen, and potash, the discussion of the previous year's experience, and concludes with the official methods adopted for the ensuing year.

The officers elected and the committees appointed by the president are as follows:—president, Dr. E. H. Jenkins of the Connecticut agricultural experiment-station; vice-president, Mr. P. E. Chazal, state chemist of South Carolina; secretary and treasurer, Clifford Richardson of the U. S. department of agriculture. Members of the executive committee: Dr. H. W. Wiley of the U. S. department of agriculture, Prof. M. A. Scovell of the Kentucky agricultural experiment-station. Other committees: phosphoric acid, Prof. W. C. Stubbs (Baton Rouge, La.), Prof. W. E. Moses (Knoxville, Tenn.), Dr. C. W. Dabney, jun. (Raleigh, N.C.); nitrogen, Dr. W. J. Gascoyne (Richmond, Va.), Mr. P. E. Chazal (Columbia, S.C.); Prof. M. A. Scovell (Lexington, Ky.); potash, Mr. Clifford Richardson (Washington, D.C.), Prof. H. A. Huston (Lafayette, Ind.), Prof. W. W. Cook (Burlington, Vt.); feeding-stuffs, Dr. G. C. Caldwell (Ithaca, N.Y.), Prof. W. H. Jordan (Orono, Me.), Mr. Clifford Richardson (Washington, D.C.); dairy products, Dr. H. W. Wiley (Washington, D.C.), Dr. S. M. Babcock (Geneva, N.Y.), Prof. H. P. Armsby (Madison, Wis.).

ARTIFICIAL RUBIES.

THE subject of artificial gems is at the present moment of considerable interest, not only financially, but also as furnishing an example of the manner in which the microscope is constantly called into use by almost every profession. Early this summer the Syndicate des diamants et pierres précieuses were informed that certain stones which had been sold as rubies from a new locality were

suspected to be of artificial origin. They were put upon the market by a Geneva house; and it was surmised that they were obtained by the fusion of large numbers of small rubies, worth at the most a few dollars a carat, into one fine gem worth from \$1,000 to \$2,500 a carat.

Some of these artificial stones were kindly pro-

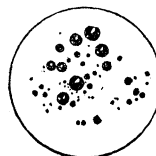


FIG. 1.—SPHERICAL CAVITIES IN ARTIFICIAL RUBY AS SEEN AT ONE TIME (ENLARGED 75 DIAMETERS).



FIG. 2.—SPHERICAL AND IRREGULAR CAVITIES IN ARTIFICIAL RUBY AS SEEN AT ONE TIME, EVIDENTLY FROM THE LOWER PART OF THE CRUCIBLE (ENLARGED 25 DIAMETERS).



FIG. 3.—ACICULAR CRYSTALS IN SAPPHIRE (ENLARGED 100 DIAMETERS).

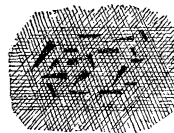


FIG. 4.—CUNEIFORM CRYSTALS IN RUBY AND SAPPHIRE (ENLARGED 200 DIAMETERS).

cured for me by Messrs. Tiffany & Co. I was not, however, permitted to break them for analysis, to observe the cleavage, or to have them cut so that I could observe the optical axes more correctly. I would at any time have detected the artificial nature of this production with a mere pocket-lens, as the whole structure is that peculiar to fused masses. Examination elicited the following facts. The principal distinguishing characteristic between these and the genuine stones is the presence in

them of large numbers of spherical bubbles, rarely pear-shaped, sometimes containing stringy portions showing how the bubbles had moved. These bubbles all have rounded ends, and present the same appearance as those seen in glass or other fused mixtures. They are nearly always in wavy groups or cloudy masses. When examined individually, they always seem to be filled with gas or air, and often form part of a cloud, the rest having the waviness of a fused mixture. Some few were observed enclosing inner bubbles, apparently a double cavity, but empty. In natural rubies the cavities are always angular or crystalline in outline, and are usually filled with some liquid, or, if they form part of a 'feather,' as it is called by the jewellers, they are often arranged with the lines of growth. Hence the difference in appearance between the cavities in the natural gem and those in the fused gem is very great, and can readily be detected by the pocket-lens. I have failed to find in any of the artificial stones even a trace of any thing like a crystalline or angular cavity. Another distinguishing characteristic is that in many genuine rubies we find a silky structure (called 'silk' by the jewellers), which, if examined under the microscope or under a $\frac{1}{10}$ to $\frac{8}{10}$ inch objective, we find to be a series of cuneiform or acicular crystals, often iridescent, and arranged parallel with the hexagonal layers of the crystal. When in sufficient number, these acicular and arrow-shaped crystals produce the asteria or star effect, if the gem is cut in *en cabochon* form, with the centre of the hexagonal prism on the top of the cabochon. I have failed to find any of them in the stones under consideration, or even any of the marking of the hexagonal crystal which can often be seen when a gem is held in a good light, and the light allowed to strike obliquely across the hexagonal prism. Dr. Isaac Lea has suggested¹ that these acicular crystals are rutile, and interesting facts and illustrations have been published by him. From my own observations on many specimens, I believe there is little doubt of the truth of this hypothesis.² My explanation is, that they were deposited from a solution, either heated or cold, while the corundum was crystallizing, and I doubt very much whether they will ever be found in any substance formed by fusion.

The hardness of these stones I found to be about the same as that of the true ruby, 8.8 or a trifle less than 9, the only difference being that the artificial stones were a trifle more brittle. The testing-point used was a Siamese green sapphire, and the scratch made by it was a little broader but no deeper than on a true ruby, as is usually

the case with a brittle material. After several trials, I faintly scratched it with chrysoberyl, which will also slightly mark the true ruby.

The specific gravity of these stones I found to be 3.93 and 3.95. The true ruby ranging from 3.98 to 4.01, it will be seen that the difference is very slight, and due doubtless to the presence of the included bubbles in the artificial stones, which would slightly decrease the density. As a test, this is too delicate for jewellers' use; for if a true ruby were not entirely clean, or a few of the bubbles that sometimes settle on gems in taking specific gravities were allowed to remain undisturbed, it would have about the same specific gravity as one of these artificial stones.

I found, on examination by the dichroscope, that the ordinary image was cardinal red, and the extraordinary image a salmon red, as in the true ruby of the same color. Under the polariscope, what I believe to be annular rings were observed. With the spectroscope, the red ruby line, somewhat similar to that in the true gem, is distinguishable, although perhaps a little nearer the dark end of the spectrum.

The color of all the stones examined was good, but not one was so brilliant as a very fine ruby. The cabochons were all duller than fine, true stones, though better than poor ones. They did not differ much in color, however, and were evidently made by one exact process or at one time. Their dull appearance is evidently due in part to the bubbles. The optical properties of these stones are such that they are evidently individual or parts of individual crystals, and not agglomerations of crystals or groups fused by heating.

In my opinion, these artificial rubies were produced by a process similar to that described by Fremy and Feil (*Comptes rendus*, 1877, p. 1029), — by fusing an aluminate of lead in connection with silica in a siliceous crucible, the silica uniting with the lead to form a lead glass, and liberating the alumina, which crystallizes out in the form of corundum in hexagonal plates, with a specific gravity of 4.0 to 4.1, and the hardness and color of the natural ruby, the latter being produced by the addition of some chromium salt. By this method, rubies were formed, that, like the true gem, were decolorized temporarily by heating.

It is not probable that these stones were formed by Gaudin's method (*Comptes rendus*, xix. p. 1342), — by exposing amorphous alumina to the flame of the oxyhydrogen blowpipe, and thus fusing it to a limpid fluid, which, when cooled, had the hardness of corundum, but only the specific gravity 3.45, much below that of these stones. Nor is it at all likely that they were produced by fusing a large number of natural rubies or corundum of

¹ Proc. Philad. acad. sc., Feb. 16, 1869, and May, 1876.

² Paper on star garnets, N. Y. acad. sc., May, 1886.

small size, because by this process the specific gravity is lowered to that of Gaudin's product. The same also holds good of quartz, beryl, etc.

The French syndicate referred the matter to M. Friedel of the Ecole des mines, Paris, supplying him with samples of the stones for examination. He reported the presence of the round and pear-shaped bubbles, and determined the hardness and specific gravity to be about the same as of the true ruby. On analysis, he found them to consist of alumina, with a trace of chromium for the coloring-matter. The cleavage was not in all cases distinct; and the rough pieces given to him as examples of the gem in its native state had all been worked, so that nothing could be learned of their crystal-line structure. When properly cut according to axes, they showed the annular rings. The extinction by parallel light was not always perfect, which he believed to be due to the presence of the bubbles. He states that he himself has obtained small red globules with these inclusions by fusing alumina by oxyhydrogen light; and, although having no positive evidence, he believes these stones to be artificially obtained by fusion.

On the receipt of M. Friedel's report, the syndicate decided that all cabochon or cut stones of this kind shall be sold as *artificial*, and not precious gems. Unless consignments are so marked, the sales will be considered fraudulent, and the misdemeanor punishable under the penal code. All sales effected thus far, amounting to some 600,000 or 800,000 francs, shall be cancelled, and the money and stones returned to their respective owners.

The action taken by the syndicate has fully settled the position which this production will take among gem-dealers, and there is little reason to fear that the true ruby will ever lose the place it has occupied for so many centuries. These stones show the triumphs of modern science in chemistry, it is true; and although some may be willing to have the easily attainable, there are others who will almost want, what the true ruby is becoming to-day, the unattainable. One will be nature's gem, and the other the gem made by man.

I presented this paper at the meeting of the New York academy of sciences, Oct. 4.

GEO. F. KUNZ.

A DULL BOOK.

WITH the exception of the members of the Royal geographical society, perhaps no body of men has done more to advance our knowledge of the geography of the earth's surface than the American missionaries taken as a class. Explorer after ex-

Persia, the land of the Imams. By JAMES BASSETT. New York, Scribner, 1886.

plorer has acknowledged his indebtedness to them for the most important successes of his exploration. Yet how little they have written, and how worthless, comparatively speaking, is that little! The present volume is no exception to this rule. The author had abundant opportunity to see and learn, and he undoubtedly saw and learned a great deal. Every page of the volume attests his knowledge of the country of which he is writing; but somehow he has not told of the things one wishes to know, while he has encumbered his book with facts that have little or no interest, and, what is more to be regretted, he has said what he has said in the most wretched English.

There are a few interesting passages in the volume, especially one where he describes the harem, or shrine, of the Imam Reza at the city of Khorasan, more often called Mashad. Singularly enough, he did not see the shrine itself, and got his description second-hand, from an artist whom he employed to paint a representation of it for him. The book further contains the most recent description of the government and social state of Persia that we have: it therefore has a value not dependent on the amount of interest one feels in its perusal. There are, in addition, good accounts of his journeyings in the region between the Black and Caspian seas; but, unfortunately, these regions have been so recently described by more entertaining, though not more competent writers, that this portion of the work lacks the charm of novelty, to say the least.

One other objection to the volume is to be found in the new and fantastic spelling of proper names adopted by the author. He says in his preface that in the orthography of Persian and Arabic names he "endeavored to adhere to the Persian and Arabic forms. In some instances this, however, did not seem to be expedient." One wishes that he had more often retained the more usual spelling. The best feature of the book, and one which goes a good way towards giving it a value at the present time, is the good map of Persia and its border regions, prepared by the author. In its preparation, special attention was given to the details of the eastern border. In conclusion, we are heartily sorry that the book was not published eighteen months ago, when it would have received more attention.

NOTES AND NEWS.

ONE of the tasks, says *Nature*, Sept. 23, undertaken by the British museum since printing has taken the place of writing in the Catalogue, is the publication of certain important sections of the Catalogue in separate parts. Thus the entries

under America, Cicero, Luther, London, and many others, have already appeared. The last of these is one of special scientific interest: it is a reprint of that part of the Catalogue which is classified under the head 'Academies.' The definition of academies for the purpose is, 'learned and scientific societies.' The entries fill five parts, making a thick folio volume of about one thousand pages. In the great written Catalogue, which is well known to all readers, twenty-eight volumes were given to this one subject. The headings have been thoroughly revised, and the names of a number of societies have been expunged, to be placed under more appropriate headings. Thus, agricultural societies, schools, political clubs, etc., which had crept into the Catalogue by degrees in course of time, have all been omitted. As it is, the total number of entries is about 32,000. 'London' is the longest sub-heading: it fills nearly 200 pages, with about 6,500 entries. Paris, St. Petersburg, and Berlin have about 3,000 entries each; Vienna and Amsterdam, about 1,000. Towns are used for sub-headings, and under these are arranged alphabetically the names of the societies issuing the publications. The old sub-headings of countries have been abolished. Formerly the sub-headings would read thus: 'Academies, etc., — Great Britain and Ireland, — London, Royal society.' The towns are now arranged alphabetically, regardless of countries. Only completed series are fully entered: works in progress are, according to the rule of the museum, catalogued with the date of the first volume, and the words 'in progress.' The work covers the greater part of the scientific literature of the world. When the catalogue of 'periodical publications' is finished, there will be little relating to science which cannot be found under appropriate heads in one or the other. It seems like looking the gift-horse in the mouth, but we cannot refrain from observing that the value of these five volumes would be enormously increased if some approximation to a subject index could be added to them. It would be a simple task to have headings, 'Chemistry,' 'Microscopy,' 'Geology,' etc., under which were given the names of the towns where societies on these subjects are to be found. The student would then have before him at a glance the names of all the societies on the globe working at any particular subject. Instances will present themselves to every student in which the first name of a society, and that by which it has to be sought in the Catalogue, does not always indicate the sphere of work.

—Two valuable papers, — 'The six inner satellites of Saturn,' and 'Observations for stellar parallax,' — the results of recent work with the 26-inch

equatorial, have just been published by Professor Hall as Appendices I. and II. of the Washington observations for 1883.

—The statue of Liberty on Bedloe's Island, New York bay, when completed, will be illuminated at night in a decidedly novel manner. The torch of the statue will contain eight electric lamps, of six thousand candle-power each, the light from which will be thrown directly upward, making a powerful beam and cloud illumination. Four or eight lamps, of six thousand candle-power each, will reflect their light upon the statue, illuminating it, and causing it to shine forth in bright relief.

—The reduction of aluminium by means of the electric current, now carried on by the Cowles company of Cleveland, O., is not effected by the voltaic arc, as is generally supposed. In the Cowles process, a connection is established between the carbon terminals through the medium of a mass of finely pulverized carbon and other materials, the terminals being drawn some distance apart after the circuit has been established. By this system the intense heat of the arc is modified, and diffused through a large area of minute particles, keeping them at a constant incandescent heat, thereby effecting the reduction of the most refractory materials.

—The Journal of the Society of arts states, that, from an official report lately issued, it appears that the production of manganese in Russia is steadily increasing. The exports for the first four months of this year amounted to 9,000 tons, as against 4,500 tons for the corresponding period of 1885. This is shipped principally from Poti, where it is conveyed by the Transcaucasian railway from the mines, in order not to interfere with the petroleum trade of the neighboring port of Batoum. Owing to the bad condition of the conveyance used in transporting it from the mines at Tchiatoor to the Transcaucasian railway, large lumps of ore only can be carried, the result being that the smaller pieces, which are equal to two-thirds of the total quantity extracted, are wasted, although equal in quality to that exported.

—From one ton of ordinary gas-coal may be produced 1,500 pounds of coke, 20 gallons of ammonia water, and 140 pounds of coal-tar. By destructive distillation the coal-tar will yield 69.6 pounds of pitch, 17 pounds of creosote, 14 pounds heavy oils, 9.5 pounds of naphtha yellow, 6.3 pounds naphthaline, 4.75 pounds naphthol, 2.25 pounds alazarin, 2.4 pounds solvent naphtha, 1.5 pounds phenol, 1.2 pounds aurine, 1.1 pounds benzine, 1.1 pounds aniline, 0.77 of a pound toluidine, 0.46 of a pound anthracine, and 0.9 of a

pound toluene. From the latter is obtained the new substance known as saccharine, which is 230 times as sweet as the best cane-sugar, one part of it giving a very sweet taste to a thousand parts of water.

—Pleuro-pneumonia is reported to be raging with unprecedented violence among cattle in Montgomery county, Penn. Eighteen cases have occurred in one township.

—Recent evidence obtained in one of the ice-cream poisoning cases in Michigan, known as the Lawton case, confirms the views expressed by Dr. Vaughan, that it was due to tyrotoxin. It appears that the cream was frozen in an old wooden building, which had been previously used as a meat-market, but had been unoccupied for some time, and was in a most unsanitary condition, admirably adapted to pollute the cream and render it poisonous.

—Cholera appears to be on the increase in southern Europe. Our last report announced its presence at Pesth, where, since that time, numerous cases have occurred. Sardinia is now said to be infected.

—At a recent meeting of the state board of health of Michigan, an analysis was presented of five hundred deaths, at ages between eighteen and sixty-five, which occurred in the Michigan mutual life-insurance company during eighteen years. The chief causes of death, in order of frequency, were lung consumption, pneumonia, typhoid-fever, apoplexy, heart-disease, cancer, Bright's disease, and quick consumption. The average age of the decedents from typhoid-fever was 38.5 years; from lung consumption, 40.17; from apoplexy, 51.10; from cancer, 48.90; and from Bright's disease, 54.50. Those who died from consumption were of more than average height, of light weight, and had a small expansion of chest. The average height was 5 feet 11 inches, while the weight was but 139.45 pounds, and the expansion of the chest but 2.93 inches. This character of organization should lead its possessor to great care in his mode of life and surroundings. While, of course, it does not necessarily denote a tendency to tuberculous disease, it is at least a suggestion which is well worth attention and consideration.

—Some faint idea of the prevalence of small-pox in London last year can be gained by the statement that eleven thousand persons suffering with this disease or recovering from it were transported by steamer between London and Purfleet, where the floating hospital was located. This hospital had at one time four hundred patients within its walls for treatment, and not infrequently a hundred would seek admittance, being carried

from the city by one of the three steamers which were assigned to this service.

—The Massachusetts state board of health reports that their chemist has found the following adulterations: milk, adulterated by the addition of water and coloring-matter, and by the abstraction of cream; spices, addition of starch and other foreign powders; cream-of-tartar, substitution of starch, gypsum, and other cheaper substances; baking-powders, alum; honey, substitution of cane-sugar and glucose; molasses, addition of glucose and presence of tin; maple sugar and sirup, presence of glucose; confectionery, terra alba, poisonous coloring-matter, fusel oil, and arsenical wrappers; canned fruits, vegetables, and meats, presence of metallic poisons. Opium, cinchona, and other drugs have also been found adulterated. Since 1882, when the law was passed providing for the inspection of food and drugs, one hundred and seventy-five complaints have been made to the courts for violation of its provision.

—Prof. W. H. Pickering and assistants witnessed the eclipse of the sun, Aug. 29, at Grenada; and of that event the professor writes, "The eclipse passed off successfully, and we lost only 45 seconds out of the 226 through clouds. I had eighteen assistants selected from the islanders, and they all did very well. I think my results will be very satisfactory."

LETTERS TO THE EDITOR.

**Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The source of the Mississippi.

IN the issue of *Science* for Sept. 24, Mr. Pearce Giles, in advocating Captain Glazier's claim to the discovery of the true source of the Mississippi, says,—

"There is nothing to be found in Schoolcraft's narrative to show that he penetrated south of Itasca. He speaks of an inlet to Lake Itasca leading from a smaller lake to the south, but clearly did not visit that smaller lake, and hence did not 'discover' it. Nor was it known to exist by Mr. Nicollet, who came after him. The latter explorer states that there are five creeks falling into Itasca. Captain Glazier discovered six, the sixth originating in a lake (not a lakelet) about five miles to the south of Itasca. This lake was not known to Nicollet. It lies nearly due south of the western arm of Itasca. He visited the others (which are mere ponds), but missed the most important one, probably owing to difficulty of access, the soil around it and for some distance from it being extremely swampy, and its inlet to Lake Itasca completely hidden by the densest vegetation. Such an inlet could not have been known to exist, except from the information of the Indian whose hunting-ground was in the immediate neighborhood. The 'infant Mississippi' flows from this lake, unknown until Captain Glazier forced his way into it in 1881."

Elsewhere Captain Glazier has told us that this lake is "about a mile and a half in greatest diam-

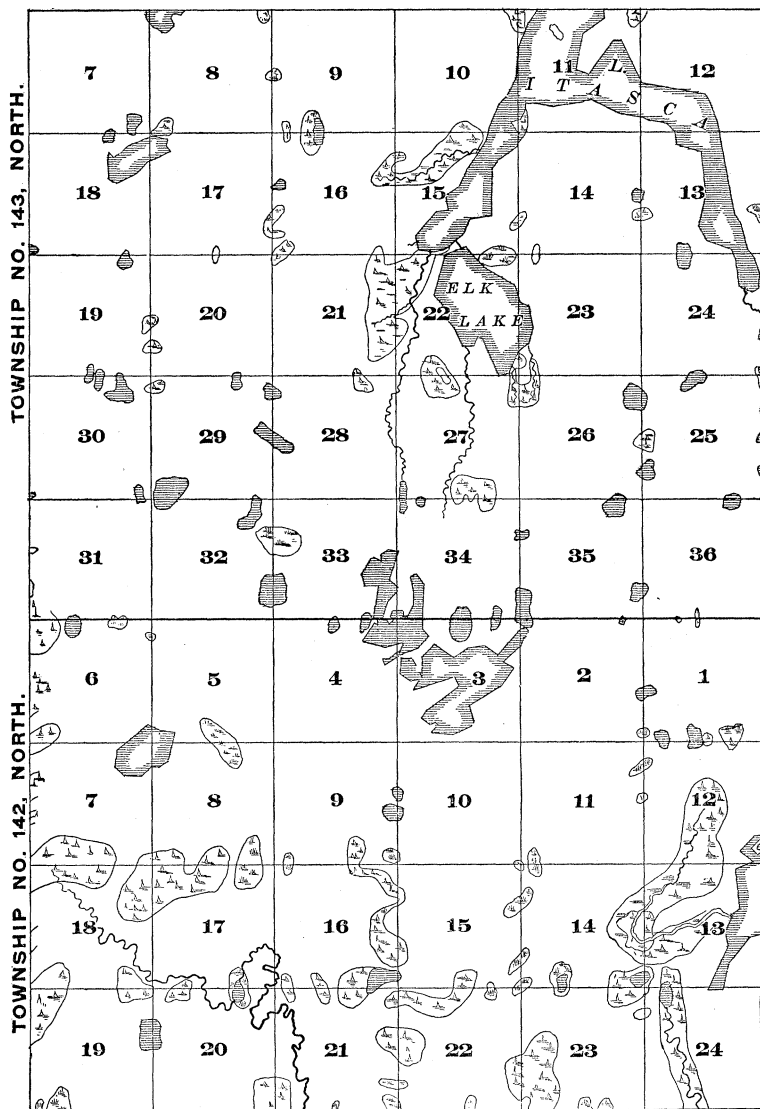
eter, and would be nearly oval in form but for a single promontory which extends its shores into the lake."

Then we are to look for Lake Glazier at the head

ence the course of the 'infant Mississippi' between Lake Glazier and Lake Itasca?

This map is a copy of the maps of two townships deposited in the government land office at Washing-

RANGE No. 36, WEST, 5th MERIDIAN.



MAP OF LAKE ITASCA AND ELK LAKE,
AND VICINITY.

Reduced from fac-simile tracings of maps of the surveys made in October, 1875, and deposited in the General Land Office at Washington, February, 1876. EDWIN S. HALL AND ASSISTANTS, SURVEYORS.

of a stream about five miles long, and lying nearly due south of the western arm of Itasca.

Now, will Mr. Pearce Giles be so kind as to point out on the accompanying map the exact location of Lake Glazier, and also trace for the readers of *Sci-*

ton. They were drawn from surveys made by Mr. Edwin S. Hall and assistants, who were in these two townships alone for over four weeks in September and October, 1875, six years before Captain Glazier stopped over night (July 21-22, 1881) in township

143, and spent a few hours the next day in making his great explorations. The accuracy of this map was fully verified by the late Mr. O. E. Garrison, who went carefully over the ground in July, 1880, in the service of the tenth U. S. census and of the Minnesota geological and natural history survey. Mr. Garrison travelled from south to north over the very line of Mr. Pearce Giles's 'infant Mississippi,' but he failed to find it; nor did he find any other stream flowing northward from any point more than two miles south of Itasca. The map is also certified to be correct by the land and timber agents of the Northern Pacific railroad, who have been over every quarter-section of these townships repeatedly since the official survey in 1875. I have now before me a copy of a letter from one of these hardy and intelligent woodsmen, written in October, 1875, describing a trip over this very ground, right on the heels of the government surveyors; and his report, while fully describing Elk Lake and Lake Itasca, makes no mention of any such lake or stream as Mr. Pearce Giles describes above.

The scale of the map is certainly adequate for Mr. Pearce Giles's use. Each small square represents a square mile, and the map thus shows us a stretch of fully seven miles south of Itasca.

It is due to "the majority of American geographers and map-makers," who, according to Mr. Pearce Giles, "now recognize Lake Glazier as the primal reservoir of the Great River," that he or Captain Glazier point out the exact location of his lake, since so many official and unofficial expeditions have failed to find it.

But really is not Mr. Pearce Giles claiming too much for Captain Glazier, in view of what has already been published by the captain and members of his party? This is the way one of the party, Mr. Bartlett Channing Paine, described the 'infant Mississippi' and 'Lake Glazier' in a letter to the St. Paul *Pioneer press*, dated Aug. 8, 1881:—

"We started for the upper end of the lake [Itasca] early next morning, finding when we reached it that it terminated in bulrushes and what seemed to be a swamp. Our guide, however, took us through the rushes, and we found that a small but swift stream entered here, up which with difficulty we pushed our canoes. *This stream is about half a mile long, and flows from one of the prettiest lakes we have seen on our trip. The shores are high rather than marshy, and covered with verdure; and the lake, which is nearly round, its regularity being broken by but one point, has a greatest diameter of a mile and a half, or perhaps two miles. Into this lake flow three small streams which rise in marshy ground from a mile to three miles from the lake. Having previously estimated the volume of water flowing into Itasca by all the streams contributing to it, and found the one from this lake much in excess of that of others, we held a little meeting on the point, and unanimously voted to call the new-found body of water Lake Glazier, in honor of the head of our party.*"

Every reader of this letter will agree with me in saying that Mr. Bartlett Channing Paine is describing, not a new-found Lake Glazier, but simply Elk Lake of the government survey of 1875,—that and nothing else. Further, Captain Glazier's own map, a facsimile of a part of which is here given, agrees with Mr. Paine, and shows Lake Glazier, as measured by the scale, less than a mile south of Lake Itasca. It is evident that Captain Glazier may have really

thought that he was the first white man to visit Elk Lake. ■

But that was not to be wondered at. People generally did not know about Elk Lake, and Captain Glazier had won a little temporary fame, which might be considered nothing worse than laughable. He might have acknowledged his blunder, and gone on making money lecturing on the 'Heroes of Mississippi exploration,' of whom he had ceased to be the chiefest and last. This, however, does not seem to suit the captain and his friends, and they are making a last desperate effort to distort the facts of geogra-



phy to suit their ambitions and conceits. The worthlessness of their actual discoveries being shown, they now propose to strike out five miles to the south over the crest of the heights of land, and locate a new Lake Glazier to suit themselves, which no mortal has ever set eye upon. Until water can be made to flow up hill, this latest Lake Glazier will not answer its purpose. The crest of the heights of land is only about three miles from the southern extremity of Lake Itasca. Yet Captain Glazier would have us believe that above Lake Itasca he found five miles of 'infant Mississippi,' one and a half miles of 'Lake Glazier,' and inlets of the latter reaching a mile or two farther south,—in all, a continuous water-course flowing into Lake Itasca from a point eight or nine

miles about due south from the western arm of that lake. To state the case is to prove its absurdity. So much for Mr. Pearce Giles's latest version of 'Lake Glazier.'

HENRY D. HARROWER.

753 Broadway, New York.

Glaciers and glacialists.

Mr. James D. Dana, in *Science* for Aug. 20, says, "the memoirs of the Museum of comparative zoölogy, founded by Mr. Alexander Agassiz, and not by his father." In 1863, Prof. Louis Agassiz got a first grant of ten thousand dollars from the legislature of Massachusetts for the publication of those memoirs. The first paper is by Theodore Lyman, and was issued in March, 1865. The title is "Memoirs of the Museum of comparative zoölogy, at Harvard college," vol. i., Cambridge, 1864-65, 4°; contents, illustrated catalogue, etc. More than twelve volumes have been issued, the first three during Louis Agassiz's life.

As to the accusation of 'Mr. Marcou's charge against Mr. Alexander Agassiz,' etc., it is almost superfluous—at least for those who have read my paper—to say that I have made no charge of any sort against Mr. Alexander Agassiz, and that his name is not even referred to.

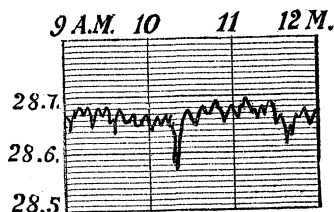
JULES MARCOU.

Cambridge, Sept. 11.

[The series was commenced as 'Illustrated catalogue,' and not as 'Memoirs,' each number independently paged; these numbers were not collected into volumes until after Louis Agassiz's death, when the closing number (9) of the second volume, published in 1876, was entitled 'Memoirs,' and the titles to the first three volumes (the third volume consisted of Nos. 7 and 8) first printed and distributed. — Ed.]

Barometer exposure.

In accordance with 'Gan's' suggestion in *Science*, viii. p. 255, I herewith present a copy of the barograph record of Blue Hill observatory for the three hours from 9 A.M. to 12 M. of Feb. 27, 1886.



The barograph from which this is taken is a Draper barograph, and multiplies three times. Its readings usually differ less than one one-hundredth of an inch from the readings of an adjacent standard Hicks barometer, with which its readings are compared every day. The barograph is situated in the lower room of a two-story tower. The air passes freely from this lower to an upper room, through a register-opening. In the top of this upper room is a trap-door opening out on the roof. The roof is flat, with a low turret around it, and the trap-door opens a little to the north of the centre. A picture of the observatory will be found in *Science*, v. p. 440.

The wind movement during the three hours given on the diagram was 55, 60, and 64 miles respectively, as shown by a Draper anemograph. The wind-velocities were quite large all day of the 27th; and

the portion of the curve given in the above diagram is but a sample of the whole barograph curve of that date, only the oscillations at an earlier hour, when the wind-velocity was greater, are more rapid and slightly larger, excepting the sharp depression at 10.20 A.M. This portion of the curve was selected in order to exhibit this sharp depression, which was coincident with the opening of the trap-door in the tower. The barograph was observed immediately before and immediately after the opening of the trap-door. The exact interval between opening the trap-door and observing the barograph is not known, but was probably less than a minute; and I feel no doubt whatever of the coincidence of the fall of pressure with the opening of the trap-door.

Several similar depressions, though not so decided, because the wind-velocity was less, were noted at a later date, when one observer watched the barograph while another opened the trap-door; and the fall of pressure coincident with opening the door was undoubted. The depression shown on the diagram at 11.35 A.M. is found to be coincident with a marked increase in the wind's velocity, lasting several minutes, followed by a more permanent increase after noon.

The following note was written on the barograph sheet of the 27th, immediately after it was removed from the instrument: "The sharp depression at 10.20 A.M. was caused by opening hatch on tower; the other sharp depressions correspond with severe gusts of wind." On this date the up-and-down oscillations of the mercury in the standard Hicks barometer were so rapid that it was almost impossible to set the vernier accurately. Mr. F. V. Pike informs me that he had the same difficulty in reading his standard barometer at Newburyport, Mass. Such oscillations of the barograph as those on the diagram are quite common on Blue Hill. They begin to be noted with wind-velocities of about thirty miles, and increase in range with increased velocity of the wind, though winds from certain directions seem to have more influence in producing them than from other directions. This is probably owing to the position of the apertures. A rapid increase or decrease of the wind's velocity as much as ten miles is, I think, always accompanied here by a corresponding decrease or increase of pressure, which leads me to believe that even small wind-velocities affect the barometer readings; but the small oscillations spoken of above do not occur, because the difference between the velocity of a gust and of a succeeding lull is not great enough to produce them. I see no reasons for believing that the barometer is any more affected by the wind here than elsewhere. 'Gan's' statement that he found small oscillations of the barograph with wind-velocities of about twenty miles, a similar statement by Mr. E. B. Weston of Providence, R. I., and the statement of Mr. Pike that he had found rapid oscillations of his barometer during the high wind of Feb. 27, convince me that the effect of the wind on the barometer is universal.

H. HELM CLAYTON.

Blue Hill meteor. observ., Sept. 23.

These serrations furnished by Mr. Clayton are certainly very extraordinary. It will be noticed that the trap-door is not upon a broad, flat roof, and also that there is only one of the effects which can be regarded as .05 below the general trend of the pressure trace. It seems probable that the barometer suspended by long steel springs has a tendency to magnify the effect. If it can be shown that the total

effect here given is due to the actual formation of a partial vacuum produced by the wind blowing across the trap-door, and not to a fault in the barograph, I will accept it. Certainly any such effect as this could have been easily learned long ago by the watching of an ordinary barometer. I have watched the barometer, both mercurial and aneroid, in very high winds, and have never seen any thing at all like this effect.

Oct. 1.

GAN.

Constitution of the earth.

Reading yesterday the address of the president at the British association for the advancement of science at the recent meeting in Birmingham, it seemed to me, that, in discussing the geology of the Atlantic and the constitution of the earth, too much is ordinarily attributed to original action of sedimentary deposition.

In the *Scientific American* of June 19, 1885, is a section of the earth on a scale of five inches to its diameter. Upon this, in a greatly exaggerated vertical scale, are figured the heights of mountains and the depths of the ocean. But in a smaller figure the author shows that the thin line used to describe the circumference would, in its thickness alone, include the whole of the departures of the mountain-peaks and deepest seas from the true circle or ellipse which should represent the outline of the globe. If we suppose a five-inch globe of terra-cotta (red and well-burned clay) to be dipped for a few moments into a muddy ditch, when it comes out with a film of water adhering to its surface, this thinnest film filled with animalcules, adhering but so quickly evaporating, will, on this scale, represent all the water contained in all the oceans and lakes; and the small quantity which the slightly porous terra-cotta globe has absorbed will represent a greater quantity of water than all that is contained, or ever has been contained, in the depths and caverns and fissures of the earth itself.

The microscopic Desmidiaceae, Pleurosigmae, wriggling vibriones and bacilli, so well known to modern science, and playing such important parts in life and death of man, will, swimming in the adherent film, be greatly magnified representations of the huge monsters which crawled in the slime of morasses, and swam in the oceans of primeval chaos, when the earth first took form, and ceased to be void. The almost infinitesimal film of water will represent all the water that ever constituted a part of this world in which we live: for science tells us that no violence has ever been able to project a stone beyond the sphere of the earth's attraction, and that no vapor of water, no gas, can float in the thin ether which surrounds or penetrates our fifty miles of atmospheric depth. What part, then, in the constitution and formation and changes of the matter forming the depths of the earth can this very small proportion of water's sedimentary deposits play in the general construction of the globe? To us infinitesimal bodies, the surrounding rocks are immense. Seen from the planet Mars in connection with the whole mass of the earth, what are they? A skin, an envelope, thinner than the model's adhering watery film. Certainly we are more directly interested in the superficial strata which we can see and feel than in the deep masses of which we can learn so little that we speculate as to whether they are solid or fluid without reaching certainty. But the depths in the general plan and

constitution of matter far outweigh the surface formations. And fire (for they are certainly hot) has had much more to do in moulding the earth than water and its sediments.

M. C. MEIGS.

Washington, D.C., Sept. 25.

The excessive voracity of the female Mantis.

A few days since, I brought a male of *Mantis carolina* to a friend who had been keeping a solitary female as a pet. Placing them in the same jar, the male, in alarm, endeavored to escape. In a few minutes the female succeeded in grasping him. She first bit off his left front tarsus, and consumed the tibia and femur. Next she gnawed out his left eye. At this the male seemed to realize his proximity to one of the opposite sex, and began to make vain endeavors to mate. The female next ate up his right front leg, and then entirely decapitated him, devouring his head and gnawing into his thorax. Not until she had eaten all of his thorax except about three millimetres, did she stop to rest. All this while the male had continued his vain attempts to obtain entrance at the valvules, and he now succeeded, as she voluntarily spread the parts open, and union took place. She remained quiet for four hours, and the remnant of the male gave occasional signs of life by a movement of one of his remaining tarsi for three hours. The next morning she had entirely rid herself of her spouse, and nothing but his wings remained.

The female was apparently full-fed when the male was placed with her, and had always been plentifully supplied with food.

The extraordinary vitality of the species which permits a fragment of the male to perform the act of impregnation is necessary on account of the rapacity of the female, and it seems to be only by accident that a male ever escapes alive from the embraces of his partner.

Westwood quotes from the *Journal de physique*, 1784, an instance in which the female of the European species — *Mantis religiosa* — decapitated the male before mating; but I know of no record of a similar occurrence with *M. carolina*, nor of the further mutilation described above.

Riley, in his 'First monthly report,' p. 151, says, "The female being the strongest and most voracious, the male, in making his advances, has to risk his life many times, and only succeeds in grasping her by slyly and suddenly surprising her; and even then he frequently gets remorselessly devoured."

In Packard's 'Guide,' p. 575, we find, "Professor Sanborn Tenney tells me he has observed the female after sexual union devour the male."

L. O. HOWARD.

Washington, D.C., Sept. 27.

A mummified frog.

My letter which appeared in your issue of Sept. 24, describing the specimen of a mummified *Hyla*, contained an error, which I here wish to correct. The frog was taken from the McLean county coal-shaft of Illinois, and not of Pennsylvania, as stated, and the newspaper account was published in Burlington, Ill. There is, however, a McLean county in Pennsylvania, and it was through this fact that the slip in question occurred.

R. W. SHUFELDT.

Fort Wingate, N. Mex., Sept. 29.

SCIENCE.—SUPPLEMENT.

FRIDAY, OCTOBER 8, 1886.

HISTORY AND POETRY IN GEOGRAPHICAL NAMES.

At a meeting of the Scottish geographical society held the 23d of July, Professor Micklejohn read a paper on the above subject. Professor Micklejohn first reminded his hearers of the poverty-stricken treatment of geography now in vogue in our schools, and after pointing out how geography, if taught intelligently, might be made fresher and of more interest, he treated the special question of his paper as follows :—

Is there any possible source of interest in the mere names which geography presents to us with such irritating profuseness? Do the names themselves constitute one of the tentacles that may catch the attention and entangle the interest of an awakening mind? Will some knowledge of what names really are and mean throw light upon geography, and will geography throw light upon them? For, in any school subject, it is clearly the educational duty of the teacher to employ every possible source of interest, provided this does not compel him to wander from the subject itself. I think we shall find, after a very short inquiry, that there lies in the names alone a most fruitful and legitimate source of interest, and one that lends additional attractions to the study both of geography and history. As things are at present, geographical names are treated as finalities, behind which you cannot go,—as what the old school of philosophers used to call ‘ultimate facts,’ inquiry into and analysis of which are entirely useless.

Let us see. There was in the beginning of the seventh century a prince of Northumbria in this island, who was very successful in his campaigns, and who pushed his frontier line as far north as the river Forth. He found there a high rock (a hill-fort or *dun*), and to it he gave the name of Dunedin. Later on, the growing city took the Teutonic name of a fortified place (*burg* or *borough*), and was henceforth known to the world as Edwinburgh or Edinburgh. Let us contrast this with a borough in the south,—with *Canterbury*. The name *Canterbury* contains within itself a whole history of England written small. First of all, there is the Celtic prefix *cant*, which seems to be the southern form of the Gaelic *ceann* (a head or point),—names which we find in *Can-*

more, *Cantire*, *Kinross*, and many others. The *t* is an inorganic addition, put there for a rest, as in the Worcestershire *clent* for *glen*. The *er* looks like a quite meaningless suffix to *cant*. But it is far from being only that. It is the pared-down form of an important word,—of the old Anglo-Saxon or Old-English genitive plural *wara*. The full form of *Canterbury*, then, is, *Canta-warabyrig*, or ‘the borough of the men of Kent.’ The flattening of *Kant* into *Kent* may be compared with that of *bank* into *bench*; of *Pall Mall* into *pell-mell*; and of many other doublets. The lighter and easier ending in *y* points to the fact that the southern Teuton got rid of his gutturals at an earlier date than the northern Teuton did; and this fact is recorded in the ending *gh*, which was no doubt sounded in the throat—borough—up to a comparatively late date in Scotland.

I was travelling in Staffordshire the other day. The name *Stafford* has probably a meaning; but it does not present itself at once to the reader. The train ran along a clear shallow stream, which flowed through green meadows,—a stream called the *Sow* (a name probably the same as that of the *Save*, which runs into the Danube), and the train came to a station on the river, called *Stamford*. Here there was a set of stones, placed at regular distances for crossing the river. The next station was *Stafford*,—the ford where there were no stones, but a *staff* was required for crossing.

There is a little country in the north of Europe—much cut down of late years by the growing encroachments of Germany—which we call *Denmark*. This name looks as final and as meaningless as any ordinary surname we happen to know. But the word *mark* is the name for the germ—the family unit—of Teutonic civilization; and, if we were to follow out its history in Germany and in this country, we should be able to read in it the origin and the rise of local freedom and of municipal liberties. Denmark is the *mark* or *march-land*, or district of the Danes, as Brandenburg is the mark of the Brandenburgers, and Finmark of the Finns. We have the same word softened in *Mercia*, the land which marched with all the other kingdoms of Saxon England, and in *Murcia*, the march-land between the Moorish kingdom of Granada and the other kingdoms of Christian Spain.

These are but a few stray instances of the light that may be thrown upon geographical names by a very slight examination and a little inquiry.

But let us now take a rapid survey of the kinds of names in the United Kingdoms of Great Britain and Ireland, and see what supplies of interest and of illustration lie ready to the hand of the geographical teacher as he introduces his pupils to those places and natural features which fall into the scheme and method of his course of teaching.

We are, first of all, met by the obvious, and indeed salient fact, that the names of most of the natural features — rivers, mountains, and lakes — have been given to them by the old and great but decaying race whom we call Celts. There is hardly a single river-name in the whole of Great Britain that is not Celtic. Men come and go, towns rise and decay; even the sites of the towns disappear and are forgotten: but the old river-names remain — they are more lasting than the names of the eternal hills, just as the rivers are more lasting than the so-called eternal hills themselves. The two commonest words for *water* or *river* are the Celtic words *avon* and *esk* or *uisge*. They were at first generally common nouns. From common nouns they became either proper names or meaningful suffixes; and we find *avon* or *ab*, in all parts of India and Europe, as the name for a stream. There are, I think, thirteen Avons in England alone, five or six in Scotland, and about ten in Ireland. The word itself is cut down and transmuted in the most curious manner. It becomes *Inn* in Fife and in the Tyrol; it becomes a mere *n* in the names of the French rivers Seine, Aisne, and Marne; and it becomes *ana* in the Spanish *Guadiana*, which is our word *avon* with the Moorish or Arabic prefix of *wadi*. In Hindostan the name appears as *ab*, as in the country of the five rivers or *Punjab*, in the country of the two rivers or *Duab*; and, last of all, it appears as *ub* in the *Danube*.

There is, on the other side of the Firth of Forth, a village called *Aberdour*, which means the place at the mouth of the river *Dour*. This last part of the word is the Celtic or Cymric word *der* (water); and this root is found in forty-four names of rivers in Italy, Germany, France, and Britain. There is *Dour* in Fife, in Aberdeen, and in Kent; we find *Doare* in Spain; an *Adour* and a *Durance* in France; and in many parts of England it takes the simple form of *der* at the end of the word, as in *Rother* (the red water), *Calder* (the winding water), in *Dniester*, and in *Derwent* (which means the clear water). To trace the similarity in all of these and many more differences — to find out the underlying identity in the varied diversity — is one of the mental exercises which combine the interest of hunting with the quiet and self-controlled use of the practical judgment, and which

we have a right to call, on this account, educational in a very high degree.

Let us take another example of a similar nature. The Gaelic and Erse word for *water* is *uisge*; and this name appears in the most protean forms in several scores, perhaps in hundreds, of river-names in Germany, Italy, France, Spain, Ireland, and Great Britain. The following are only a few of its transmutations: *Esk* and *Ex*; *Usk*, *Ugg*, and *Ux*; *Ock*, *Oke*, and *Ox*; *Use* and *Ouse*; *Ax* and *Iz*; *Eska*, *Eskey*, and *Esker*; *Oise*, *Issa*, and *Issy*; *Isère* and *Isar*; *Isen* and *Etsch*. And many of them give us the names, and with the names the positions, of such towns as *Exeter* and *Exmouth*; *Axbridge* and *Axminster*; *Uxbridge*, *Oxford*, and *Bannockburn*.

If the teacher knows the old Celtic word for *mountain*, — as, indeed, every one does, — he can go a pretty long way in throwing some light upon some geographical names. Not to insist too much on the historical conclusions drawn from the fact that we find the Gaelic-Celtic form *Ben* in the west and north, while the Cymric-Celtic form *pen* is found only in the east and south, the teacher can point to the identity of *pen* and *ben*, and show how *pen* appears in *Pennine* and *Apennine*, in *Gramscian* and *Pentland*, in *Pennigant* and *Penrith*, in the Spanish *Pentra* and the Greek mountain *Pinus*. Then, again, we have the same root in *pin* and *pinnacle*, in *pine* and *spine*. The Gaelic form, *Ben* is found in *Benan* (the hill of birds), *Benledi* (the mount of God), *Benvrachie* (the spotted mountain), *Benmore* (the great mountain), and many others.

Again, *Aber* and *Inver* are two dialectic forms of the same word, the *n* in *inver* being probably inorganic. Both words mean 'the mouth of a river.' *Aber* is found repeatedly in Brittany, about fifty times in Wales, about twenty times in middle Scotland, three or four times in England, but never in Ireland. We know the position of such towns as *Aberconway*, *Aberystwith*, *Aberdeen*, *Aberwick* or *Berwick*, *Aberbrothock* or *Arbroath*, the moment we utter their names; and the same may be said of the towns at the mouths of the Ness, the Leithen, the Aray, and the Ury; that is, *Inverness*, *Innerleithen*, *Inveraray*, and *Inverury*.

Take another minor point from a Celtic language. *Ard* is the Gaelic for *point* or *height*, and we find it in *Ardrnamurchan*, *Ardwich-le-Street* (the high town on the great Roman road), and many other names. But if we go down to the south coast of England, — to Hampshire and Devonshire, — we find that a small projecting point used by sailors to land their boats at is called a *hard*, with the southern breathing attached; and the name was most probably left there by the oldest Britons.

If, moreover, the teacher knows that *Llan* and *Kil* mean a church, *Tor* a height, *Innis* or *Ennis* or *Inch* an island or water-girt peninsula; that *Linn* means a pool, as in *London* and *Lincoln*; that *Nant* means a valley, as in *Nantwich*, — if he knows the meaning of these and a few other Celtic words, he can put into the hands of his pupils a key which will enable them to unlock the meaning of hundreds of names, not only in Great Britain and Ireland, but on the continent of Europe.

Let us next take a very quick glance at the earliest Roman contributions to our names of British places. These are only six, and they were given to Britain and British times. They are *castra*, *strata* (*strata via*), *fossa*, *vallum*, *portus*, and *colonia*. One or two examples will be enough for our purpose. There were in early British Britain no roads worthy of the name; and, as soon as the Romans made up their minds to hold this island, they set to work, and drove several splendid roads through it from south to north. First of all, from Richborough, near Dover, they made a road, called *Watling Street*, through Canterbury and London, by Stony Stratford, on to their standing camp on the Dee, — the *Castra* of the northern Roman army, which is still called simply *Chester*. This road ran on through Westmoreland, across the top of a mountain, which is called *High Street* to this day. Ermin Street ran from London to Lincoln; Icknield Street, from Norwich to Exeter; and there were several other great roads. But the point for the geographical learner is, that these splendid works can still be traced, partly by their actual remains, and partly by the names of the Saxon towns that were of necessity built upon them, and nowhere else. The word *street* enters into the names of these towns in the character either of a suffix or of a prefix. Thus we have Streetham, Stretton, and Stratton; Stretford and Stratford; Chester-le-Street and Ardwich-le-Street; and a great many others.

The corresponding word in Scandinavian languages is *gate*, which is a derivative of *go*, and the Low-German form of the High-German *gasse*. This word, however, we now find restricted to *streets*; that is, roads in towns or cities. Thus Edinburgh has its Cowgate and Canongate; Dundee, its Overgate and Nethergate (which some weak persons wished to change into Victoria Street and Albert Street); York, its Michlegate, Jubbergate, Castlegate, Fishergate, and sixteen others. But the geographical inquirer, looking abroad, finds a much wider application for the word. The name indicates not merely a street in a town, but also a street through lines of hill or cliff; and in this sense we have it in Reigate (which is Ridgegate), Margate, Sandgate, and the Ghauts of India

(which are either passes through ranges of hills, or passages down to the banks of the rivers). This by the way.

But the Latin word which contains for us the largest amount of history is *castra*. And it not only contains a great deal of Roman history: it contains also a considerable amount of English history. This word we find generally as a suffix to our names of towns, and we find it in three different forms, — *caster*, *chester*, and *cester*. In the Anglican kingdoms of the north it appears in the form *caster*; in the Saxon kingdoms it takes the form of *chester*; and in Mercia, which was mainly Anglican, but under Saxon influence, we find the intermediate form of *cester*. But in the district north of the Tees, the Saxon form *chester* re-appears; and we find such names as Ribchester, Chesterholm, Rutchester, and others. The two forms *Castor* and *Chester* stand right opposite to each other at one point in England. The river Nen divides Northamptonshire, which is Danish, from Huntingdonshire, which is purely Saxon; and on the opposite banks, standing on either side of the river, we find two villages, both with the same name, but the one called *Castor* and the other *Chesterton*. The main point, however, for the young inquirer to notice, is that all these places were at one time Roman camps; and from the number of these he can himself easily judge as to the military character and social intensity of the Roman occupation.

We now come to the third layer of civilization in this island, — the layer which was deposited by the Teutons, who immigrated into this country from the northern part of the land which we now call Germany. This deposit began to be laid down in Great Britain in the middle of the fifth century; and the character of this contribution to British habits is best indicated by Mr. Isaac Taylor in his 'Words and places.' He says, "England is pre-eminently the land of hedges and enclosures. On a visit to the continent, almost the first thing the tourist notices is the absence of the hedgerows of England. The fields, nay, even the farms, are bounded only by a furrow." And he points to the universally recurring terminations *ton*, *ham*, *worth*, *stoke*, *fold*, *park*, and *bury* — all of which convey the notion of enclosure or protection — as proof of the seclusiveness of character of the Anglo-Saxon, of how strongly "imbued was the nation with the principle of the sacred nature of property, and how eager every man was to possess some spot which he could call his own."

Now, if the learner is armed with the knowledge and the meanings of these words, and with some power of tracking them under their different forms, he has the power of fixing upon the chief Anglo-

Saxon settlements in Britain and in other countries. We have, for example, the name *Haddington*, as the town of the sons of Haddo; *Symington* and *Thankerton*; *Campbelton* and *Hartington*; *Boston*, which is St. Botolph's town; *Northampton* and *Southampton*; and many more. But the suffix *ton*, as the most common local termination of our British local names, is worth a little more examination. The word is the Low-German form of the High-German *zaun* (a hedge); and the word *tun* or *ton* meant in the older times a place surrounded by a hedge, or fortified by a palisade. In this sense it indicated a croft, a homestead, or a farm; and this sense it still retains in Scotland. Thus the isolated *ton* might become the nucleus of a village, the village might grow into a town, and the town into a city with millions of inhabitants.

In the same way, a *stoke* is a place stockaded, a place surrounded and guarded by stocks and piles. The word takes the four different forms of *stock*, *stoke*, *stow*, and *stol*. We have it in Stockbridge, the suburb at the bridge over the Leith; in Stockholm and Woodstock; in Stoke-upon-Trent; in Stow; and in Bristol, which was in the oldest English *Briegstow*.

Another highly significant suffix is *burgh*, *borough*, or *bury*, which comes from the old verb *beorgan* (to shelter or cover). The last is the distinctively Saxon form; the two first are Anglican or Norse. But, indeed, the root has spread itself over many countries; and we find it in Spain in the form of Burgos; in France, as *Caesar's burg*, or Cherbourg; in Asia Minor, in the shape of Pergamos. We have it also in Germany in Augsburg (that is, the city of Augustus), in Hapsburg or Habichtsburg (the stronghold of the Austrian hawk), in Edinburgh and in Musselburgh. The forms Shrewsbury, Shedbury, Glastonbury, and other such names, are, as I said, found mostly in the northern parts of Britain. One of the oldest and strongest forms of the root exists in the word *Burgundians*, who were among the first dwellers in burgs, burghs, or fortified towns.

While it is interesting to trace the existence of Anglo-Saxon names in Germany and other parts of the continent, it is curious to find them in considerable numbers in the north-west of France. Mr. Isaac Taylor points out that "in the old French provinces of Picardy and Artois there is a small, well-defined district, about the size of Middlesex, lying between Calais, Boulogne, and St. Omer, and fronting the English coast, in which the name of every village and hamlet is of the pure Anglo-Saxon type." The French people, we know, have a marvellous knack of contorting English words; and we have seen in their languages such forms — which cannot be called *parce*

detorta — as *redingote*, *doggart*, and *boule-dogue*. In the same way, in this north-western French district, we find the English names *Holbeach*, *Warwick*, *Applegarth*, *Sandgate*, and *Windmill*, appearing as *Hollebecque*, *Werwich*, *Appegarles*, *Sangatte*, and *Wimille*.

Passing from names of towns to names of counties and kingdoms, it gives some indication of the past history of the island to find that Cumberland is the land of the Cymry; that Sussex, Essex, Wessex, and Middlesex were the kingdoms of the south, east, west, and central Saxons; that Surrey was the Sodereye, or south realm; and that Cornwall or Cornwales was the kingdom of the Welsh or strangers, who dwelt on the *horn* or peninsula.

The word *Welsh*, which appears as a word, as a prefix, and as a suffix, is one of considerable importance in the history and the geography of Europe. All Teutonic peoples call other nations by the general name of foreigners, *wealhas*, *Wälsch*, or Welshmen. In this sense England has its Wales, and, indeed, two of them; France has its Wales; Germany has its Wales; and so has Scotland and even Ireland. The word appears in many forms. In German and in English it is found as *wal* in *wallen* (to wander) and *Waller* (a pilgrim); in *walk*, in *walnut*, and other names. A German calls French beans *Welsh beans*, and speaks of going into France or Italy as going into Welshland. The Bernese Oberlander calls the French-speaking canton that lies to the south of him *Wallis*; and the Celts of Flanders are called *Walloon*s by their Teutonic neighbors. *Walloon*s probably means 'very great strangers indeed;' just as *balloon* is a big ball, while *ballot* is a little ball. In Old English, Cornwall was called *Cornwales*, the country inhabited by the Welsh of the Horn.

The fourth deposit of local names was made by the next horde of incursionists who made their way to these shores from the continent. The Northmen, Norsemen, or Normans have left their mark on many parts of Scotland, England, and Ireland.

One of the most striking tokens of their visit is contained in the fact that we call the north-east corner of this island by the name of *Sutherland*. Such a name must evidently have been given by a people — a conquering people — who lived to the north of Great Britain. And this was so. Sutherland was the mainland to the south of the great jarldom of Orkney. Here, accordingly, we find the Norse names for *island*, *town*, *valley*, and *farm*, — *oe* in *Thurso*, *Wick*, *dale* in *Helmsdale*, and *saetir* or *stir*. In the Shetlands every local name, without one exception, is Norwegian. We have *Sanda* (the sand island), *Stronsa* (the island

in the stream or current), *Westra* (the western island), etc. The Norsemen called the Orkneys the *Nordreyjar*; the Hebrides, the Southern Islands or *Sudreyjar*, a name which has been compressed into the odd dissyllable *Sodor*. The two sees of the *Sudreyjar* and the Isle of Man were combined in the twelfth century, and put under the Archbishop of Trondjhem, who appointed the Bishops of *Sodor* and *Man* down even to the middle of the fourteenth century. But, more, the enormous number of Norse names bears witness to the fact that the Shetlands, the Orkneys, the Hebrides, and the Isle of Man were not most useful dependencies of the Scottish crown, but jarldoms attached to the kingdom of Norway. And this was the case down to 1266. The test-word for the Norse settlements in Great Britain is the ending *by*. This appears in our language as *byre* (a cow-house), and in France as *bue* or *boeuf*. In the Danelagh, which lay between Watling Street and the river Tees, the suffix *by* has pushed out the Saxon *ton* and *ham*; and to the north of Watling Street we find six hundred instances of its occurrence, while to the south there is scarcely one. In Lincolnshire alone there are a hundred names of towns and villages which end in *by*. We find this ending in hundreds of names in Jutland and in Schleswig: in the whole of Germany there are not six. In Scotland we have the names *Lockerby* and *Canonby*, both in Dumfriesshire; in England we have *Grimsby*, *Whitby*, *Derby*, and many more; in Wales we have *Tenby*, and many other Norse names on the fiords that branch out of Milford Haven; while in France—that is, in Normandy—we have *Criqueboeuf* (or crooked town), *Marboeuf* (or market town), *Quitteboeuf* (or *Whitby*), *Elboeuf* (or old town), and many others.

The Norsemen have left their names on our capes, our arms of the sea, and our islands, as well as on our towns. *Ness* or *naze* is their favorite word for *cape*; and we have it in Fifeness, Sheerness, Foulness, Whiteness; the *Naze* in Essex; *Dungeness*, or Cape of Danger; *Skipness*, or Ship-Headland; *Blancnez* and *Grisnez*, on the coast of France; and a great many more. A *ford*, or fiord, is the Norwegian name for an arm of the sea up which ships can go, just as *ford* is the Saxon name for a passage across a river for men or for cattle. Both words come from the old verb *faran* (to go), the root of which word is found in *far*, *fare*, *welfare*, *fieldfare*, etc. We find the Norse meaning of *ford* in Wexford, Waterford, and Carlingford, in Ireland; in Milford and Haverford, in Wales; and in Deptford (the 'deep reach') on the Thames, and Oxford in England. Besides the Norse names for islands which we find in Scotland, in Thurso and Staffa (which is

the island of staves), we can discover many in England, generally with the spelling *ea* or *y*. Thus Anglesea is the Angles' Island; Battersea, St. Peter's Isle, in the Thames; Chelsea, the isle of chesel or shingle; and Ely is the Isle of Eels. But the most common form of this Norse word is simply *a*, and it is found in greatest abundance in Scotland. The Norse vikings were in the habit of retiring to one of the small islets off the coast during the winter months; and, when summer returned, they issued forth from them to resume their piratical cruises. These small islands still bear Norse names, while the local names on the mainland are Celtic. We have scores of those names ending in *a*, as Scarba, Barra, Ulva, Jura, Isla, Ailsa, Rona, etc.

Just as we saw that *ford* had two meanings,—one from its Norse, the other from its Saxon users,—so the name *Wick* has two meanings, each testifying to the different habits of the two nations. With the Saxon a *wick* was an abode on land,—a house or a village; with the Norsemen it was a station for ships,—a creek, an islet, or bay. The Norse vikings, or 'creekers,' lay in the *wicks* or *wicks* they had chosen, and sallied out when they saw a chance of a prize. The inland *wicks* are Saxon, and the abodes of peaceful settlers; the Norse *wicks* fringe our coasts, and were the stations of pirates. Of the latter kind we have Wick, in Caithness; Lerwick; Wyke, near Portland; Alnwick, Berwick, in Northumberland and Sussex; and Smerwick, or Butter Bay, in Ireland.

The parliaments of the Norsemen were called *things*, and this name they have left in several parts of Great Britain. A small assembly was a *Housething*,—a word we have in our own *hustings*; a general assembly of the people was an *Althing*; and the Norwegian parliament is to this day called the *Storthing*, or great council. These *things* met in some secluded spot,—on a hill, an island, or a promontory,—where no one could disturb the members. In the Shetland Isles we find the names *Sandstthing*, *Delting*, *Nesting*, etc.,—the seats of local *things*; while the spot for the general council of the island was called *Tingwall*. In Ross-shire, too, we find a *Dingwall*, and in Cheshire a *Thingwall*. In Essex the word takes the softened and flattened Saxon form of *Denge-well*. In the Isle of Man the meeting-place was called *Tynwald Hill*; and the old Norse *thing* (name and thing) has survived, without a break in its existence, since the time of the Old Norse kings, but the institution has died out in Iceland and in Denmark. The Three Estates of the Isle of Man meet every year on Tynwald Hill, and no laws are valid in the island until they have been duly proclaimed from the summit.

We can, moreover, trace the identity of the Norwegian occupation by the number of local Norse names, and the contrasts are sufficiently striking. In Lincolnshire there are about three hundred Norse names; in Yorkshire, about three hundred; in Bedford and in Warwickshire, only half a dozen.

So much for history in our local names, and one might have easily said a hundred times as much on the subject. But there is interest, for both young and older hearers, in details and in points that are of much smaller importance.

The open-eyed and open-minded teacher, who is always on the lookout for whatever will bring into connection and interest with his lessons, will not disdain even the slight assistance he will gain from the relative positions of places, and the names that have come from this. He tells his pupils, for example, that another name for the German Ocean is the North Sea; but he will surely go a step further than this, and show him that there is a South Sea also, which the Dutch call *Zuyder Zee*. Another step, and he will point out that the Germans call the Baltic the East Sea, and that the West Sea must of necessity be the Atlantic. In the same way, the Weser or Vesper is the West River. In China this use of names of direction seems to reach its height: for there we have Peking and Nankin, the northern and southern coasts; Peling and Nanling, the northern and southern mountains; Peho and Nanhoo, the northern and southern rivers; and Nanhai, the Southern Sea.

Even the simple epithets *old* and *new* lend some interest to the teacher's work in geography. The word *old* takes many forms: it appears as *alt*, *elt*, *al*, and *ald*, in Althorp, Eltham, Albury, Aldborough. *New* is an epithet, which, like every other thing on earth, must itself grow old. Thus New Forest is one of the oldest forests in Great Britain; New college is one of the oldest colleges in Oxford, for it was founded in 1386; New Palace Yard, in Westminster, dates from the eleventh century; and the fifty-two New Streets in London are among the oldest in that vast wilderness of houses. There are in England 120 villages with the name of *Newton*, 10 towns called *Newcastle*, and 17 called *Newbiggen*. It is interesting, too, to observe the forms that the word *new* may take; as *Neuf* in Neufchatel, *Nov* in Novgorod, *Ne* in Neville, and *Na* in Naples or Neapolis.

Color, too, gives some interest to our geographical names. Thus Cape Verde is 'the cape fringed with green palms.' The local name for the Indus is the *Nilab* (or Blue River); and the mountains in the south of India are called the *Nilgherrie* (or Blue Mountains), — a name which we find also in

Virginia. The city of Atria or Adria, from which the Adriatic took its name, is 'the black town,' because it was built upon the black mud brought down by the Padus. The *Himáláya*, or, as we call the range, the Himaláya, is 'the abode of snow;' and Lebanon means 'the white mountain.' The word *Apennines* means 'the white heads;' Mont Blanc, Sierra Nevada, Ben Nevis, Snowdon, Sneealten, Snaefell, and many other mountains, all have the same meaning. The word *alp* itself, being a form of *albus*, gives us the same indication; and connected with it are Albania, Albion, and Albany, which was the old name of Scotland.

With pupils of a more advanced age, it would be useful to show the identity of the Hindostani *abad* and the Hebrew *beta* with the English *bottle* (we have it in Newbattle and Bothwell) and *bold*, with the Slavonic *Buda*, and with the Cymric *bod* in Bodmin and Boscawen. Allahabad is 'the house of Allah;' Bethany, 'the house of dates;' Bethlehem, 'the house of bread;' and Bethel, 'the house of God.'

We have seen that names throw light upon history, and that history throws light upon names; but names also throw light upon physical changes, and on the variations of climate that have taken place in this island. Thus we have in different parts of England places and parts of towns called *Vineyard*, where no vines can nowadays grow. Mr. Thompson, the eminent gardener, tells us that when he was a boy the island of Mull had many orchards of excellent apples, while now the whole surface of the island is not adequate to the production of a single eatable apple. He tells us, too, that at Hatfield, near London, — the seat of Lord Salisbury, — there used to be fourteen hundred standard vines, which produced the grapes that found the house in its supplies of wine; whereas now there is not a single grape produced except under glass. The name *vineyard* in Britain is therefore nowadays a name, and nothing more.

There is, not far from Loch Maree, in Ross-shire, a farm that bears the name of *Kinloch Ewe*; that is, the head of Loch Ewe. But Loch Maree, or Mary's Loch, was, geologists tell us, at one time only one of the upper reaches of Loch Ewe; and this conclusion of geologists is borne out by the name *Kinloch Ewe*, which is not on Loch Ewe at all, but about a mile above the upper end of Loch Maree. But there can be no doubt that this farm marks the point to which the older Loch Ewe at one time extended.

Local names, too, give us evidence of animals that are now extinct in this island. The existence of the wolf and the bear in England is marked by such names as *Wolfeslow* in Herefordshire, and *Barnwood* in Gloucestershire. The wild boar, or

eofer, was found at Eversley, Evershot, and Evert-ton; and the presence of the beaver is indicated by such names as *Beverly*, *Beverstone*, and *Bever-coates*.

Changes in our customs, too, are to be traced in old names. Two of the strongest marks of the importance of a town are to be found in the existence of a market, or the possession of a bridge over the neighboring stream. The Old-English verb *ceapian* (to buy) gives us the words *cheap*, *goodcheap*, *dogcheap*, *chapman*, *chaffer*, *horse-couper*, and *chop*; and it also gives us the prefixes *chipping*, *chep*, and *kippen*. Cheapside and Eastcheap were the old market-places of London; and into Cheapside, even to this day, run Bread Street (where Milton was born), Milk Street, and the Poultry. In the north of Europe we find Copenhagen, which means 'Chipping or Market Haven;' Nordkioping, which means 'North Market;' and many others.

Even the mistakes in names are full of suggestion. The readers of Sir Walter Scott's 'Pirate' know Fitful Head in Shetland as the abode of Norna. But Fitful Head, though a quite appropriate name, is a mere corruption, undoubtedly by mistake of the old Scandinavian name *Hvit-fell* (or White Hill). Cape Wrath, again, has in its oldest meaning nothing to do with storm, but, in its old Norse form of *Cape Hvarf*, simply indicates a turning-point, — the point where the land trends in a new direction; and it contains the same root as the words *wharf* and *Antwerp*.

Many similar corruptions are to be found in England. The walk from Buckingham Palace to Westminster is now called *Birdcage Walk*, which is only a meaningful corruption of *Bocage Walk*; *Chateau Vert*, in Oxfordshire and in Kent, has been altered into *Shotover Hill*, and a legend about Robin Hood and Little John has been attached; *Beau Lieu*, in Monmouthshire, has grown into *Bewley*; *Grand Pont*, in Cornwall, into *Gram-pound*; and *Bon Gué* (the good ford), in Suffolk, has been, too, naturalized into *Bungay*.

So far, we have seen that history and philology become the loyal servants of the teacher. Shall we be able to say the same of poetry? How shall the most brilliant outcome of the human intellect, the most inspired expression of the mind, the product of the noblest faculties, strengthened by and intertwined with the deepest emotion, help our much study of the world?

To some extent it has already done so. Longfellow has produced for us a geographical library in thirty-two volumes, which he calls 'Poems of places.' Four of them have been republished by Messrs. Macmillan & Co. in this country; but the whole thirty-two volumes ought to be in the library

of every large school and college. Such a collection contains, and must contain, a great deal of what is good, of what is indifferent; and we know that neither gods nor men columns tolerate the indifferent in poetry.

But let us choose that which is good, and hold fast to it. How does Longfellow introduce Edinburgh to us? We who know the city, and have loved it long, know that it is a poet's dream in stone, watched by the everlasting hills, looked in upon by the eternally-during sea, bowered in trees, intermingled with rocks and crags and cliffs, and possessing a history that no taint of doubt or cowardice has ever sullied.

How does Burns describe this world-famous city? —

"Edina, Scotia's darling seat,
All hail thy palaces and towers,
Where once beneath a monarch's feet
Sat Legislation's sovereign powers!

"Thy sons, Edina, social, kind,
With open hand the stranger hail;
Their views enlarged, their liberal mind,
Above the narrow, rural vale."

Sir Walter Scott sings of the city in other scenes, and with the thought of war in his mind: —

"Nor dream that from thy fenceless throne
Strength and security are flown;
Still, as of yore, queen of the north,
Still canst thou send thy children forth.
Ne'er readier at alarm bell's call
Thy burghers rose to man thy wall,
Than now, in danger, shall be thine,
Thy dauntless voluntary line;
For fosse and turret proud to stand,
Their breasts the bulwarks of the land."

Not inferior are the lines of Alexander Smith, whom many of us still remember: —

"Edina, high in heaven wan,
Towered, templed, Metropolitan,
Waited upon by hills,
River, and widespread ocean, tinged
By April light, or draped and fringed
As April vapor wills,
Thou hangest, like a Cyclop's dream,
High in the shifting weather-gleam.
'Fair art thou, when above thy head
The mistless firmament is spread;
But when the twilight's screen
Draws glimmering round thy towers and spires,
And thy lone bridge, uncrowned by fires,
Hangs in the dim ravine,
Thou art a very Persian tale, —
Or Mirza's vision, Bagdad's vale."

Not less true, not less adequate, is the sonnet written by A. H. Hallam, the early-lost friend, in sorrow for whom Tennyson wrote his 'In memoriam': —

"Even thus, methinks, a city reared should be —
Yea, an imperial city, that might hold
Five times a hundred noble towns in fee,
And either with the might of Babel old,
Or the rich Roman pomp of empery,
Might stand compare, highest in arts unrolled,
Highest in arms: brave tenement for the free,
Who never crouch to thrones, or sin for gold,

*Thus should her towers be raised, — with vicinage
Of clear bold hills, that curve her very streets,
As if to vindicate, 'mid choicest seats
Of Art, abiding Nature's majesty ;
And the broad sea beyond, in calm or rage,
Chainless alike, and teaching liberty."*

But this side of the question would carry us too far. What I am driving at is a humbler aim. All through this statement I have been trying to insinuate, — to suggest that the teacher should bring into all his lessons on geography the maximum of connection ; that he should try to make the map *live* before his pupils ; that in education, as in a statue, there should be no dead matter ; and that the satisfaction of the day's curiosity, or mental appetite, should be followed by the growth of a stronger appetite still. I think that we who live in this latter part of the nineteenth century may congratulate ourselves on the immense amount of young active intellect that has thrown itself into education, and on the better methods that, with this youth and activity, have been imported into our schoolrooms. It is not so long ago that boys were kept for years over the *As in praesenti* and the *Propria quae maribus* before they were able to form a first-hand acquaintance with even the easiest Latin author : nowadays a boy does not learn a new word or a new inflection without being asked at once to build his new knowledge into an interesting sentence. Not long ago children were taught lists of names without seeing a picture, a diagram, a model, or a map, and this was called geography : now we have the geographical societies, both of Edinburgh and of London, working steadily for them, and showing them all that there is of beautiful and wonderful, and strange and thoughtful, in the life of man upon this remarkable planet.

Another point before I have done. The path of education is the path of discovery ; it is not the dead-beaten road upon which you can sow no new seed, it is not the region of the second-hand, the fossilized thought, the mere traditionary and repetition idea. If, then, the teacher is to make those old times live again, — those old times that have left ineffaceable marks in our names of places, just as the underlying rocks have left traces of themselves in our soil, — he must excite the curiosity of his pupils, and set them hunting for new examples of old names ; must ask them to find the old in the new, and the new in the old. It is as true of education as of life, — and the one is only an epitome and compressed symbol of the other, — that for us all it is

"Glad sight whenever new and old
Are joined through some dear home-born tie :
The life of all that we behold
Depends upon this mystery."

The passion of hunting is the strongest passion

in human nature : can we gratify this passion in the schoolroom ? I think we can ; and geography is one of the happy hunting-grounds in which we may be able to gratify it.

DR. CHARLES A. POWERS of New York contributes an article to the *Medical record*, giving the results of his treatment of twenty-one cases of injury by the toy pistol, and states that two deaths this year from this cause have come to his knowledge. In by far the greater number of cases the palm of the hand was the seat of the injury, although some had received injuries to the fingers, the eyelid, or the abdominal wall. The wounds varied in depth from one-quarter of an inch to two inches, and were due to wads from the blank cartridges or to pieces of the percussion caps which were blown into the tissues. The injured parts became inflamed, pus formed, and in many cases a septic condition of the blood followed, eventuating in some cases in tetanus and death.

— The official returns of the minister of education in Prussia show that the number of students in philology, philosophy, and history, in this home of the philosophical sciences, has been steadily declining from Michaelmas, 1881, to Easter, 1885 ; the numbers for the six sessions being 2,522, 2,535, 2,504, 2,398, 2,311, 2,258, 2,181. In three years and a half the decline in the number of philosophical students is thus fourteen per cent.

— Instances are not infrequently recorded in medical journals of the passage of needles and pins from one part of the body to another. In a recent case a needle one inch and a quarter long, which had been swallowed some months before, was removed from the arm of a brick-layer.

— A woman in Russia recently consulted a physician on account of a peculiar deformity from which she suffered. It consisted of a projection at the lower end of the spine which formed a tail two inches long, and half an inch wide. It contained two vertebrae, and these were covered with fat, hair, and skin.

— Russian newspapers state that prospects are good for the speedy construction of a canal between the White Sea and Lake Onega, thus affording water communication between the White and Baltic seas.

— John Ericsson, the well-known inventor, who is now eighty-three years of age, is still hale and hearty, and works as steadily, and as many hours per day, as he did twenty years ago.